CTS and IB Computer Science

Sir Winston Churchill High School, Calgary, Canada.

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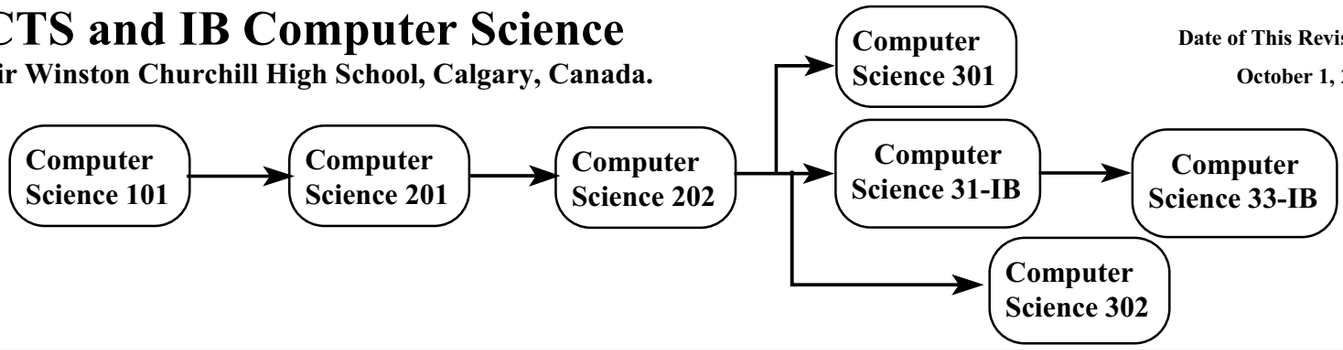

CTS 1-Credit "Courses"	Brief Description	Details & Resources Used
Computer Science 101 . . . . . 3 credits *Prerequisite: completed grade 9.* → Computer Science 1 . . . . . INF 1210 → Programming 1 . . . . . INF 1080 → Programming 2 . . . . . INF 2150	**Introduction To Computer Programming** Students learn to think algorithmically with 3-dimensional, interactive graphics. Like movie directors, students create and direct (program) scripts and scenarios in "virtual worlds" of animated, interacting objects.	**Learning To Program With Alice** (ISBN: 0131424203). **The Alice System** (www.alice.org) is an object oriented programming language and 3D object animation tool developed as a project in virtual reality by the Stage 3 Research Group at Carnegie Mellon University .
Computer Science 201 . . . . . 3 credits *Prerequisites: Computer Science 101, grade 9* → Programming 3 . . . . . INF 2160 → Programming 4 . . . . . INF 2170 → Programming 5 . . . . . INF 2180	**Object-Based Programming Fundamentals** Using the Java computer programming language, students create simple classes and manipulate objects of predefined classes, including simple Java graphics classes. Loops, branching and arrays are introduced.	**Horstmann, Cay BIG JAVA 2nd Ed**, (ISBN: 0471697036) ‣ Using Objects ‣ Decisions ‣ Implementing Classes ‣ Iteration ‣ Fundamental Data Types ‣ Array Lists and Arrays ‣ Programming Graphics ‣ String Handling **Eclipse Development Environment:** www.eclipse.org
Computer Science 202 . . . . . 3 credits *Prerequisites: Computer Science 201, grade 9* → Computer Science 2 . . . . . INF 2210 → Object-Oriented Programming 1 . INF 2220 → Object-Oriented Programming 2 . INF 3220	**Object-Oriented Design and UML** Systematic class design using a subset of UML (Unified Modelling Language)., test driven development, debugging and error handling are introduced. Recursion, inheritance and polymorphism get demystified.	**Horstmann, Cay BIG JAVA 2nd Ed**, (ISBN: 0471697036) ‣ Recursion ‣ Testing & Debugging ‣ Sorting & Searching ‣ Big-O Notation ‣ Designing Classes ‣ Interfaces & Polymorphism ‣ Inheritance ‣ Exception handling **Unified Modelling Language:** www.uml.org
Computer Science 301 . . . . . 3 credits *Prerequisites: Computer Science 202, grade 10* → Computer Science 3 . . . . . INF 3210 → Dynamic Data Structures 1 . . . . . INF 3230 → Dynamic Data Structures 2 . . . . . INF 3240	**Dynamic Data Structures & File Handling** Each structure is presented in the context of the standard Java collections library using iterators, sets and maps. Students also learn to implement their own structure classes. Java's AWT and Swing classes are applied.	**Horstmann, Cay BIG JAVA 2nd Ed**, (ISBN: 0471697036) ‣ Event Handling ‣ Graphical User Interfaces ‣ Linked Lists ‣ Binary Search Trees ‣ Stacks & Queues ‣ Files and Streams ‣ Sequential File Handling ‣ Direct File Handling **Kjell Tutorials**: http://chortle.ccsu.edu/java5/cs151java.html
Computer Science 302 . . . . . 3 credits *Prerequisites: Computer Science 202, grade 10* → Programming Application 1 . . . . INF 3150 → Programming Application 2 . . . . INF 3160 → Programming Application 3 . . . . INF 3170	**Applying Algorithms To Problem Solving** Students are guided through ever more challenging problems of different "types" categorized by solution: sorting, shortest path, approximate, random, compression, maximum flow, sequence comparison, etc.	**Horstmann, Cay BIG JAVA 2nd Ed**, (ISBN: 0471697036) **Kjell Tutorials**: http://chortle.ccsu.edu/java5/cs151java.html **USACO Training Program** <http://train.usaco.org/usacogate> **TopCoder Algorithm Tutorials** <http://www.topcoder.com> **Analysis of Algorithms Lectures** by Steven Skiena <http://www.cs.sunysb.edu/~algorith/lectures-good/index.html>

Churchill candidates of IB Computer Science are encouraged but not required to take more than one IB course. IB candidates must earn 75 CAS hours.

Computer Science 31-IB . . . . . 6 credits *Prerequisites: Computer Science 202, grade 10* → Computer Science 3 . . . . . INF 3210 → Dynamic Data Structures 1 . . . . . INF 3230 → Dynamic Data Structures 2 . . . . . INF 3240 → Career Transitions Project 3A . . CTR 3110 → Career Transitions Project 3B . . CTR 3120 → Career Transitions Project 3C . . CTR 3130 **A student cannot get credit in Computer Science 301 and Computer Science 31-IB**.	**Dynamic Data Structures & File Handling** Each structure is presented in the context of the standard Java collections library using iterators, sets and maps. Students also learn to implement their own structure classes. Java's AWT and Swing classes are applied. IB Dossier at either the IB Computer Science Standard Level or Higher Level. Dossiers document the use of UML (Unified Modelling Language) diagrams, Javadoc comments, exception handling, unit testing .	**Horstmann, Cay BIG JAVA 2nd Ed**, (ISBN: 0471697036) ‣ Event Handling ‣ Graphical User Interfaces ‣ Linked LIsts ‣ Binary Search Trees ‣ Stacks & Queues ‣ Files and Streams ‣ Sequential File Handling ‣ Direct File Handling **Kjell Tutorials**: http://chortle.ccsu.edu/java5/cs151java.html **Dossier Project:** "Students, through projects, extend and enhance competencies developed in ... (CTS) strands to contexts that are personally relevant." [*Career Extensions*] **The project must apply database management, linked lists or binary search trees, direct access file handling, and extensive programmer and user documentation.**

IB Higher Level Computer Science Candidates earn a grade from IB on a scale of 0...7 based on a program dossier (35%) and two final examinations (65%). This grade and the associated IB Certificate are separate from grades and credits in CTS courses administered by Alberta Education.

Advanced credit at the University of Calgary: Applicants with a grade of 5 or higher will receive credit in Computer Science 231 and a half course junior Computer Science. Students who successfully complete a challenge examination may receive credit for Computer Science 233 in lieu of the half junior Computer Science. Source on 1 October 2007: <http://www.ucalgary.ca/admissions/admission_requirements/international_requirements/ib_credits.html>

Computer Science CS 33-IB . . 5 credits
Prerequisites: Computer Science 31-IB, grade 11

→ Hardware/Software Analysis . . . . . INF 3010
→ Local Area Networks . . . . . INF 3020
→ Information Management Tools . . INF 3080
→ Visualizing the Future . . . . . DES 3170
→ Portfolio Presentation . . . . . DES 3190

Non-Programming IB Topics:

- Systems Life Cycle
- Software Life Cycle
- Systems Analysis
- Language Translators
- Computer Architecture
- Computer Systems
- Networked Computer Systems
- Data Representation
- Errors
- Utility Software
- Social Significance & Implications of Computer Systems
- The Case Study
- Number Systems and Representations
- Boolean Logic
- Algorithmic Evaluation
- Magnetic Disk Storage
- Operating Systems and Utilities
- Computer/Peripheral Communication

IB Higher Level Computer Science students write two international examinations in the month of May. Each exam lasts two hours & fifteen minutes. Churchill classes have always scored significantly above the world average.